TRANSMITTAL OF APPEAL BRIEF

Docket No.
43289-205707

In re Application of: Valta et al.

Application No.	Filing Date	Examiner	Group Art Unit
10/501,950-Conf. #3429	July 21, 2004	E. White	1623

Invention: METHOD FOR MANUFACTURING CELLULOSE CARBAMATE

TO THE COMMISSIONER OF PATENTS:

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/Eric J. Franklin/ Dated: September 8, 2008

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	:	
Valta et al.	:	Attorney Docket No.: 43289-205707
Application No.: 10/501,950	:	Art Unit: 1623
Filed: July 21, 2004	:	Examiner: E. While

Title: METHOD FOR MANUFACTURING CELLULOSE CARBAMATE

BRIEF ON APPEAL

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Brief is submitted pursuant to the Notice of Appeal filed April 8, 2008.

Real Party In Interest

The real party in interest in this appeal is the assignee, VALTION TEKNILLINEN TUTKIMUSKESKUS, Vuorimiehentie 5, FIN-02150 Espoo, Finland, by virtue of an assignment from the inventors to VALTION TEKNILLINEN TUTKIMUSKESKUS, which was recorded in the U.S. Patent and Trademark Office on July 21, 2004, at reel 015977, frame 0973.

Related Appeals and Interferences

Applicants are unaware of any related appeals or interferences which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

The application as filed included claims 1-16. In a preliminary amendment submitted with the application as filed on July 21, 2004, Applicants amended claims 1-16 and presented claims 17-30. In a response submitted June 9, 2006, to the office action issued March 9, 2006, Applicants amended claims 1, 11, 21, and 23, presented claim 31, and cancelled claim 4. In a preliminary amendment submitted February 12, 2007, with a request for continued examinatino subsequent to the final office action issued August 15, 2006, Applicants amended claim 1 and presented claim 32. In a response submitted September 11, 2007, to the final office action issued March 12, 2007, Applicants presented claim 33, amended claims 2, 3, 10, 11, 13-19, 21, 31, and

32 and cancelled claim 1. On October 25, 2007, the Examiner issued another final office action, having withdrawn the finality of the office action issued March 12, 2007. On April 8, 2008, Applicants submitted a notice of appeal, appealing the rejection of claims 2, 3, and 5-33.

Status of Amendments

Applicants have not submitted any amendments to the claims subsequent to the issuance of the final office action.

Summary of Claimed Subject Matter

The invention as recited in independent claim 33 relates to a method for manufacturing cellulose carbamate (p. 1, lines 5 to 6). This method includes providing a mixture including cellulose, a liquid, auxiliary agent, and urea (p. 3, lines 33 to 34; p. 4, line 19; p. 5, lines 1 to 2; and p. 5, lines 13 to 15). The dry matter content of the mixture is high (p. 3, line 34; p. 5, lines 15 to 16; p. 6, lines 18 to 19; and p. 7, line 37). The liquid content in the mixture is less than 40% (p. 4, line 20; p. 6, lines 20 to 21; p. 12, Table 1; and p. 14, Table 3). This mixture has a liquid content less than 40% and is subjected to mechanical working (p. 4, lines 1 to 2; p. 4, lines 12 to 13; p. 4, lines 16 to 18; p. 4, lines 30, 34, 37; p. 5, lines 1, 13; p. 6, lines 2, 5, 17, and 30; p. 7, line 21; p. 8, line 1; p. 9, line 13; p. 11, line 10; and p. 13, line 5). In the mechanical working, absorption of the auxiliary agent and urea to the cellulose is enhanced and a reaction between the cellulose and urea is performed at least partly (p. 3, line 36; p. 4, line 1; p. 4, lines 11 to 15; p. 4, lines 35 to 37; p. 5, line 12; p. 8, lines 19, 23; and p.9, line 18). The mechanical working

includes compressing, rubbing, and stretching the mixture a plurality of times (p. 4, line 31; p. 5, lines 2 to 3; p. 6, line 34; p. 7, lines 11 to 12; p. 7, lines 22 to 23; p. 8, lines 36 to 37; p. 9, lines 5 to 7; p. 9, lines 18 to 19; p. 11, line 11; p. 11, line 26; p. 12, lines 4 to 5; p. 12, Table 1; and p. 13; line 7).

According to the embodiment recited in claim 32, the mixture is transferred directly, without drying in an intermediate step (p. 8, lines 2 to 3), from the mechanical working to an oven to complete the reaction between the cellulose and urea (p. 4, line 2; p. 8, lines 1 to 2; p. 12, lines 11 to 12; and p. 14, line 3).

According to one embodiment recited in claim 17, the liquid content in the mixture is less than 30% (p. 4, lines 20 to 21; p. 6, line 21; page 12, Table 1; and page 14, table 3).

As recited in claim 18, according to another embodiment, the liquid content in the mixture is less than 25% (p. 4, line 21; p. 6, line 21; page 12, Table 1; and page 14, table 3).

Advantages of the invention recited in the claims include providing a method for prepare solutions and final products of high quality and providing control of properties of the product. Also, the claimed invention can provide high quality products starting with ordinary and inexpensive wood pulp.

Grounds Of Rejection To Be Reviewed On Appeal

I. The Examiner rejected claims 2, 3 and 5-33 under 35 U.S.C. § 103(a) as being unpatentable over EP 402 606 to Rahman et al. in view of U.S. patent 2,134,825 to Hill et al.

Argument

I. Claims 2, 3 and 5-33 are patentable under 35 U.S.C. §103(a) over EP 402 606 to Rahman et al. in view of U.S. patent 2,134,825 to Hill et al.

The combination of Rahman et al. and Hill et al. does not suggest the invention recited in claim 33 since, among other things, neither Rahman et al. nor Hill et al. suggests subjecting a mixture including cellulose, a liquid, auxiliary agent, and urea, where the liquid content in the mixture is less than 40% to mechanical working.

The Examiner's argument on page 3, line 6 of the Final Office Action is as follows: "... *the Hill et al. patent does suggest mechanical working of a similar mixture that involve preparation of cellulose carbamate*". Further, on page 3, line 13, the Examiner goes on by saying: "*...Hill et al. patent does disclose mechanical working of the product thereof.*" In the paragraph "Response to Arguments" in the Office Action issued March 12, 2007, the Examiner had stated "*However, the description disclosed in the Hill et al patent on page 2, 2nd column, 3rd paragraph, wherein the mixture is "passed through squeeze rolls which press out the excess steeping liquor" embraces the description of the mechanical working in instant claim 1*".

Hill et al. does not suggest mechanical working of the mixture. Rather, as described at page 2, right hand column, lines 39 to 42, Hill et al. suggests passing the sheeted cellulose through squeeze rolls which press out the excess steeping liquor. This does not suggest mechanical working of the mixture.

At the stage where the cellulose is sheeted, the solid components of the mixture exist in the static condition. The components are not in a condition where they can be subjected to continuous kneading action or the like as represented by compressing, rubbing and stretching the mixture a plurality of times. First, the cellulose is in sheeted form. Being in sheet form means that the fibers have limited movement with respect to each other. When the sheeted cellulose is passed between the squeeze rolls, it is a once through operation where the fibers only move instantaneously closer to each other while the excess liquid escapes. No phenomena such described at page 3, line 35, through page 4, line 2, of the present application can occur simultaneously because this is mechanical dewatering in one step rather than continuous working. Thus, the procedure of Hill et al. is not to be confused with the working by running the mixture between a nip of two rolls in the present invention, such as shown in Fig. 2, because the fibers are subjected to working repeatedly in this embodiment of the present invention.

On page, 3 lines 9-13 of the Final Office Action, the Examiner goes on to state "*The advantages of the instantly claimed process referred to on page 3, line 35 through page 4, line 2 of the instant specification that involve penetration of the chemicals into the fibre, the homogenization of the pulp, the reduction of the crystallinity of the pulp, the DP adjustment of*

the product, which are partly caused by mechanical working is not persuasive since the Hill et al. patent does disclose mechanical working of the product thereof." One of ordinary skill in the art will immediately recognize, when reading the process description of Hill et al., that no such phenomena as penetration of the chemicals into the fibre, the homogenization of the pulp, the reduction of the crystallinity of the pulp, and the DP adjustment of the product can happen during squeezing step of the excess water, and the comparison between Hill et al. and the claimed invention in this respect lacks scientific foundation.

Hill et al. does not suggest mechanical working of a mixture having liquid content of less than 40 %, when the working comprises compressing, rubbing, and stretching the mixture a plurality of times. The Examiner has failed to point out specific portions in Hill et al. where these two features could be found in conjunction with mechanical working.

In the Office Action issued March 12, 2007, the Examiner stated at page 3, "*The Rahman et al. publication discloses synthesis of a cellulose aminomethanate (which is identical to cellulose carbamate) in Example IV, wherein initially 1807 grams of sulfate pulp is steep in 21 kilograms of steep liquor containing 3.0% sodium hydroxide and 20.0% urea. The sodium hydroxide in this example embraces the alkalizing agent disclosed in instant the instant claims. This description suggests a reaction medium containing about 40% liquids, which embraces the amount of liquid disclosed in the instant claims*". However, Rahman et al. does not suggest a liquid content under 40% in those phases of the process where the mixture is agitated for thoroughly contacting cellulose with the auxiliary agent and urea. Rather, Rahman et al. suggests process phases, which might be considered similar to carry out the contact among

mixture components, where the mixture exists as a slurry. Rahman et al. describes this at col. 9, lines 11-13, for example.

Every example of Rahman et al. suggests stirring or agitating phases where the urea-containing mixture is slurry. If such phases were considered to correspond to the phase of mechanical working of a mixture according to the present invention, they are being carried out on a mixture having a totally different consistency than the present invention as recited in claim 33, which includes less than 40% liquid content. With a slurry of Rahman et al., it is impossible to obtain the advantageous effects described on page 3, line 35, through page 4, line 2 of the description. A slurry of Rahman et al. is not in a physical entity that could be compressed, rubbed and stretched a plurality of times.

Rahman et al. suggests a mixture having a low liquid content only when the mixture is in a static state. That is, Rahman et al. only suggests a mixture having a low liquid content in situations where excess liquid has been drained off or pressed out and the mixture is left to stand, possibly under the influence of heat. While in that state, the mixture is **not** compressed, rubbed and stretched several times. Rahman et al. does not include any teaching, suggestion or motivation to replace a conventional stirring or agitating phase of a high liquid content slurry with a mechanical working phase of a mixture having a liquid content of less than 40% in a part of a process where excess liquid has been removed. The removal of excess liquid typically means the termination of the stirring or agitation phase for contacting the cellulose and an auxiliary agent and urea. The liquid content as defined in claim 33 is important in the sense that, as contrasted with known processes, it brings about the possibility of mechanical working of the

mixture in such a consistency that the phenomena described on page 3, line 35, through page 4, line 2, are possible simultaneously.

Furthermore, Rahman et al. suggests a three-phase process that includes an initial step of contacting the cellulose with a sodium hydroxide/urea solution at low temperature, a second step of washing by a urea solution, and a final step of oven treatment at high temperature. Both the initial and second steps are performed when the mixture is slurry. The three-phase process is shown in the examples I to V and VII of Rahman et al. In example VI, the washing step is omitted. In Rahman et al., it is practically impossible to get a liquid content of lower than 40% mechanically, such as through pressing, filtering or other processes.

On the other hand, according to the invention recited in independent claim 33 the processing takes place in a single step, at low liquid content, and under mechanical working of the low liquid content mixture. In other words, there are not initial and second phases suggested by Rahman et al. According to the present invention as recited in claim 33, the absorption of the auxiliary agent and urea to the cellulose and at least partly the reaction is caused by the mechanical working, not low temperature.

Furthermore, the definition "at least partly performing reaction between the cellulose and urea" is important, since in Rahman et al. the reaction takes place only in an oven. The role of mechanical working, on the other hand, is emphasized in the present application, such as at the paragraph bridging pages 3 and 4; page 4, lines 11 to 13; and page 4, lines 33 to 37.

The combination of Rahman et al. and Hill et al. also does not suggest the present invention as recited in claim 32 since, among other things, the combination does not suggest the low liquid content, which results in the reaction already starting during the mechanical working step. For example, Hill et al. suggests passing sheeted cellulose through a steeping bath, then through squeeze rolls which press out the excess steeping liquor, and the impregnated sheets are then passed through a hot-air blast oven (page 2, right-hand column, lines 39 to 47). Pressing out the excess liquid is clearly a drying step (mechanical drying by pressing), where no reaction takes place. Furthermore, drying takes place in the oven, as described at page 2, lines 44 to 47 of the right hand column, which state, "*...hot air blast oven which continuously dries and bakes the sheets at any desired temperature and for any desired period of time, thus causing the urea to react with the cellulose*". As noted above, the invention as recited in claim 32, due to the low liquid content, the reaction starts already during the mechanical working step.

The combination of Rahman et al. and Hill et al. also does not suggest the invention recited in claims 17 and 18. Along these lines, claims 17 and 18 define liquid contents that are lower and that consequently distinguish the invention recited in claims 17 and 18 still further over the cited references. Concerning claims 17 and 18, the Examiner asserts on page 4, line 25 through page 5, line 1 of the Office Action issued March 12, 2007, "*The amount of liquid disclosed in the mixture set forth in instant claims 17-19 is noted, but does not indicate reason for allowance of the instant claims since proportions of ingredients, to impart patentability to an otherwise obvious chemical composition, must produce more than a mere difference in degree in the properties of the composition...The proportions must be critical, i.e. they must prioduce a difference in kind rather than degree* ". Claims 17 and 18 do not create a difference of degree of

the properties of the mixture, but rather a difference in degree of the objects achievable by the method. The less liquid is in the mixture, the more efficient is the penetration of the chemicals into the fiber, the homogenization of the pulp, and the reduction of the crystallinity of the pulp. Furthermore, the composition together with its unique use, including repeated mechanical working at a high dry matter content, offers a clear difference in the kind of method, when it is compared with rather conventional technology suggested by the combination of Hill et al. and Rahman et al.

On page 3 of the Final Office Action issued October 25, 2007, the Examiner addresses advantages of the claimed process as follows, "*The advantages of the instantly claimed process referred to on page 3, line 35 through page 4, line 2 of the instant specification that involve penetration of the chemicals into the fibre, the homogenization of the pulp, the reduction of the crystallinity of the pulp, the DP adjustment of the product, which are partly caused by mechanical working is not persuasive since the Hill et al. patent does disclose mechanical working of the product thereof. One of ordinary skill in this art would not know if such properties of the instantly claimed invention are different from those of the Rahman et al. and Hill et al. patents since specific values of the properties, such as the crystallinity of the pulp, have not been recited in the instant claims and references for comparison.*" Advantages of the claimed method are not necessarily in the properties of the final product. Rather, advantages of the claimed invention include allowing a shorter and simpler process in achieving a high-quality product. The processing time can be used as one variable to achieve he desired final quality.

Mechanical processing, or working, that is, compressing, rubbing and stretching the

material has four roles: first, to reduce the degree of crystallinity of the cellulose molecule; second, to make the mixture of cellulose and urea more uniform and homogenous thus introducing urea as close to cellulose molecule as possible for later reaction; third, to start the carbamation reaction between urea and cellulose; and, fourth, to start to evaporate water from the mixture. The water removal is possible because the urea works as a processing aid once it is evenly distributed in the mixture. Water removal before reaction is advantageous because the heating of the cellulose-urea mixture up to temperature 130 degrees Centigrade is faster if there is less water.

The claims relate to a method. Therefore, the way of processing material, independently of the properties of the final product, is an advantage in itself. According to 35 U.S.C. § 101 "Inventions patentable" it is stipulated that, "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." The present invention is a new and useful process, regardless of the end product that can be varied according to the process parameters.

In view of the above, the combination of Rahman et al. and Hill et al. does not suggest the invention recited in claims 2, 3, and 5-33. Therefore, the combination of Rahman et al. and Hill et al. does not make the invention recited in claims 2, 3, and 5-33 obvious. Accordingly, Applicants respectfully request reversal of this ground of rejection.

Conclusion

In view of the above, EP 402 606 to Rahman et al. in view of U.S. patent 2,134,825 to Hill et al. does not suggest patentable features of the claimed invention. Therefore, the combination of Rahman et al. and Hill et al. does not make the present invention obvious. Accordingly, Applicants submit that the claimed invention is patentable over the combination of Rahman et al. and Hill et al. and respectfully request reversal of the rejection and issuance of the Notice of Allowance.

The undersigned authorizes the Commissioner to charge insufficient fees and credit overpayment associated with this communication to Deposit Account No. 22-0261.

Respectfully submitted,

Date: September 8, 2008

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Appendix A

Claims On Appeal

2. The method according to claim 33, wherein the auxiliary agent is an alkalizing agent.

3. The method according to claim 33, wherein the auxiliary agent is hydrogen peroxide.

5. The method according to claim 4, wherein the mixture is subjected to the working between two surfaces moving in relation to each other.

6. The method according to claim 5, wherein in the working, the mixture is pressed through openings in one of the surfaces.

7. The method according to claim 5, wherein the working is performed by running the mixture through a nip formed by two rolls.

8. The method according to claim 7, wherein the surface of at least one of the rolls is provided with a grooving.

9. The method according to claim 5, wherein the same mixture is recirculated several times between the two surfaces moving in relation to each other.

10. The method according to claim 33, wherein more than 50 % of the liquid is water.

11. The method according to claim 33, wherein the auxiliary agent and an aqueous solution of urea are premixed into cellulose in such a way that the liquid substances are added in atomized form.

12. The method according to claim 11, wherein the premixing is performed in a fluidized bed mixer.

13. The method according to claim 33, wherein the processing time is less than 30 min.

14. The method according to claim 33, wherein the cellulose is wood cellulose or dissolving pulp or cotton linters.

15. The method according to claim 33, wherein the cellulose is finely ground to a grain size of < 2 mm.

16. The method according to claim 33, wherein during the working, the temperature of the mixture is adjusted by the circulation of an external heating or cooling medium.

17. The method according to claim 33, wherein the liquid content in the mixture is less than 30 %.

18. The method according to claim 33, wherein the liquid content in the mixture is less than 25 %.

19. The method according to claim 33, wherein the liquid content in the mixture is less than 22 %.

20. The method according to claim 2, wherein the alkalizing agent is sodium hydroxide.

21. The method according to claim 33, wherein the mixture is subjected to a mechanical working in such a way that the components of the mixture are subjected to working repeatedly.

22. The method according to claim 6, wherein the working is performed in a sieve press.

23. The method according to claim 10, wherein more than 70 % of the liquid is water.

24. The method according to claim 10, wherein more than 90 % of the liquid is water.

25. The method according to claim 10, wherein all of the liquid is water.

26. The method according to claim 13, wherein the processing time is less than 20 min.

27. The method according to claim 13, wherein the processing time is less than 15 min.

28. The method according to claim 13, wherein the processing time is less than 10 min.

29. The method according to claim 15, wherein the cellulose is ground to a grain size of less than 1 mm.

30. The method according to claim 15, wherein the cellulose is ground to a grain size of less than 0.7 mm.

31. The method according to claim 33, wherein the auxiliary agent, an aqueous solution of urea, and dry, powdery urea are premixed into cellulose in such a way that the liquid substances are added in atomized form.

32. The method according to claim 33, further comprising:

transferring the mixture directly, without drying in an intermediate step, from the mechanical working to an oven to complete the reaction between the cellulose and urea.

33. A method for manufacturing cellulose carbamate, comprising:

providing a mixture including cellulose, a liquid, auxiliary agent, and urea, where the liquid content in the mixture is less than 40 %; and

subjecting the mixture where the liquid content is less than 40 % to mechanical working, thereby enhancing absorption of the auxiliary agent and urea to the cellulose and at least partly performing a reaction between the cellulose and urea, wherein said mechanical working comprises compressing, rubbing, and stretching

the mixture a plurality of times.

Appendix B

Evidence Appendix

None

Appendix C

Related Proceedings Appendix

None